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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ALEJANDRO, RAYMOND	
ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 06/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/049,705	FOGER ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This communication is being submitted in response to the amendment filed 04/12/04. The applicants have overcome the objections. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, the 35 USC 102 rejection still stands for the reasons of record. Thus, the claims are finally rejected.

Drawings

1. The drawings were received on 04/12/04. These drawings are acceptable.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Okada et al 5302470.

The present application is directed to a process for producing electricity in a fuel cell wherein the disclosed inventive concept comprises the specific reforming temperature.

With respect to claim 1:

Okada et al disclose a desulfurized raw fuel material 1 that is mixed with steam at an appropriate ratio in a mixer 3 and transferred to a steam reformer 4 where it is converted by stream reforming reaction to a fuel gas consisting of hydrogen. The fuel gas is further transferred

to a fuel electrode 7 in a fuel cell unit 6 where it is partially consumed by electrochemical reaction with a supply of air 9 fed by a compressor 8 to an oxidant electrode 10 of the fuel cell unit 6 so that electricity is generated while water is released (COL 8, lines 20-37).

EXAMPLE 1 shows that the reforming reaction takes place at reaction temperatures of 450 °C (COL 11, line 50-60). In addition, **EXAMPLE** 1 shows that a flow of town gas composed of the integredients listed in Table 1 was preparatorily heated to about 380 C, and fed into the desulfuration reactor for desulfurization together with a recirculating reformed gas (i.e. a fuel gas supplied from the carbon monoxide shift converter in recirculation. The resultant desulfurized gas was processed by steam reforming reaction under reaction temperatures of 450 C (COL 11, lines 44-58). *Accordingly, fresh town gas composed of the ingredients listed in TABLE 1 and recirculating reformed gas are mixed together therein.* The fuel gas after the steam reforming was then transferred via the shift converter to the fuel electrode in the fuel cell unit where it is reacted with air from the oxidant electrode to generate electricity (EXAMPLE 1 or COL 11, lines 44-58). In addition, it is also disclosed that the amount of methane is increased at the exit of the steam reformer (COL 12, lines 12-15). *Thus, additional methane is added to the fuel gas which is being fed into the fuel cell.*

EXAMPLES 1-7 show the use of town gas, naphta, LPG among others (See EXAMPLES 1-7). *Thus, the fuels are higher carbon (C_{2+}) hydrocarbons.* **TABLE 1** also shows methane content of 86.9 % by volume (See Table 1).

With respect to claims 2-3 and 16-17:

Okada et al shows methane content of 86.9 % by volume (See TABLE 1).

As to claims 4, 18-19:

Okada et al teach the steam reforming reaction at least at temperature of *about* 450 °C (COL 7, lines 11-16). It is also disclosed a temperature range of 350-400 °C (COL 7, line 5-7).

With respect to claim 5:

EXAMPLE 7 shows adiabatic conditions (refer to TABLE 2) as well as quasi-adiabatic conditions (COL 15, line 25-27).

With respect to claims 6 and 20-21:

It is disclosed that the S/C ratio is at least 0.7, or 1.5 depending on the specific catalyst material (COL 4, lines 53-65/COL 7, lines 17-22/COL 9, lines 17-22). *Thus, Okada et al directly teach the use of the S/C ratio within the claimed ratio.*

As to claims 7-8 and 13:

It is disclosed that surplus steam remains unused during the steam reforming reaction (COL 3, lines 35-40). It is also disclosed that the fuel gas discharged from the fuel electrode 7 is transferred to a burner 11 in the steam reformer 4 where it is mixed therewith and burned for heating the steam reformer (COL 2, lines 42-47). It is also disclosed that the separated steam is transferred to the mixer 3 where it is mixed with the raw fuel material 1, then, fed to the steam reformer 4 for use in the steam reforming reaction (COL 2, lines 55-60). It is disclosed that a reactive gas after electrode reaction is recovered for reuse (COL 9, lines 57-64).

On the matter of claims 9-11:

Okada et al discloses the use of raw fuel material selected from methane, ethane, propane, butane, natural gas, naphta, kerosene, gas oil, LPG, town gas and their mixtures (COL 7, lines 32-35/ COL 1, lines 35-40/ ABSTRACT/ EXAMPLES 1-7).

As to claim 12:

Okada et al disclose that high temperature fuel cell e.g. a molten carbonate fuel cell or a solid oxide fuel cell are types of fuel cell that can be employed for this purposes (COL 7, lines 40-44). *Thus, the specific temperature reaction is inherent to these fuel cell and their operations.*

With respect to claims 14-15:

Okada et al teach that the raw fuel material is mixed with steam and converted by the steam reforming reaction in a steam reformer to a fuel gas (COL 8, line 65 to COL 9, line 3). It is evident from **TABLES 3-6** that a complete conversion of the higher carbon (C_{2+}) hydrocarbon occurs as the composition of the fuel gas shows no content of the higher carbon (C_{2+}) hydrocarbon (See TABLES 3-6).

Thus, Okada et al anticipates the instant claims.

Response to Arguments

4. Applicant's arguments filed 04/12/04 have been fully considered but they are not persuasive. Throughout the foregoing amendment applicants have contended that a requirement of claim 1 is that methane present in the fuel stream is reformed in the fuel cell meaning "that the anode of the fuel cell includes a suitable catalyst in order to catalyze reforming of methane in order to produce hydrogen" (page 8, lines 4-9) and that "there is however no disclosure in Okada et al of steam reforming of a higher hydrocarbon fuel in order to generate a fuel stream having a minimum methane content of 20 % by volume, followed by internal reforming of methane in this fuel stream in the fuel cell". Nevertheless, it is first noted that the present claim language is completely silent as to the specific anode functionality as well as to the internal reforming process at all.

Furthermore, it is also pointed out that in **EXAMPLE 1** it is clearly indicated that town gas composed of the ingredients listed in TABLE 1 is mixed with recirculating reformed gas which is then processed by steam reforming reaction at reaction temperatures of 450 C (EXAMPLE 1 or COL 11, lines 44-58). TABLE 1 also illustrates that the town gas is composed of at least 86.9 % of methane (TABLE). Additionally, it is also taught that amounts of methane are increased at the exit of the steam reformer (COL 12, lines 12-16). *This means that additional methane is added to the fuel gas prior to feed it into the fuel electrode.* Hence, all of the above stated, it is strenuously contended that the prior art reasonably discloses the pre-reforming and reforming steps, a methane content of no less than 20 % as well as the further introduction of the fuel gas into the fuel cell. Especially considering that fresh town gas composed of more than 20 % of methane is being fed therein plus the fact that Okada et al disclose adding more methane at the exit of the steam reformer. In this respect, it is also asserted that unless applicants provide objective evidence demonstrating that the processed fuel gas of the prior art does not contain less than 20 % of methane, the present claim language is anticipated by Okada et al. Moreover, it is also asserted that Okada et al has not referred to the fuel stream strictly as hydrogen gas or so; Okada et al has referred to such stream as fuel gas, in general. Thus, this also provides an adequate indication that even though Okada et al's fuel cell system requires hydrogen as reactant (as argued by the applicant), Okada et al, to certain extent, has not discarded the possibility of employing a mixed fuel gas stream also containing methane. Hence, the burden is shifted to the applicant to provide such objective evidence demonstrating that the prior art of record does not teach at all the use of fuel gas fed into the fuel cell comprising the claimed material content.

Having said that, it is further contended that since applicants have already established "that the anode of the fuel cell includes a suitable catalyst in order to catalyze reforming of methane in order to produce hydrogen" (page 8, lines 4-9 of the amendment of 04/12/04), it is thus stated and maintained the since anodes of fuel cells have catalytic material incorporated therein, the residual methane of Okada et al's fuel gas, at least, to some degree and when contacted with the anode catalyst, must reform regardless of any degree of conversion. It is noted that such degree of conversion is also currently absent from the present claim language. As a result, it is positively contended that, at least, a nominal minimum amount of methane which is present in the fuel gas of Okada et al when contacted with the catalyst material of the anode aspect of the fuel cell reforms.

Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., *"that the anode of the fuel cell includes a suitable catalyst in order to catalyze reforming of methane in order to produce hydrogen"* and *"the internal reforming"[as the main source for generating reactant])* are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). *Incidentally, it is noted that the claim language recites "in which the methane is reformed and electricity is produced", this is quite different from intending to allege that the hydrogen mainly generated by the reformed methane is*

the primary source of reactant; or even setting forth that methane is being used as the main source of reactant to generate electricity by direct oxidation. That is to say, the claim language only recites "supplying the fuel stream" (What is meant by fuel stream? What is the specific content?),"methane is reformed" and "electricity is produced", and thus, it does not clearly establish the specific reaction mechanism or required process for generating electricity.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
Art Unit 1745